

# Claims

- [c1] 1. A method of rapid color recognition according to a basic color component data of a pixel to recognize and output a color code, the method comprising:  
providing a regular triangle plane by normalizing basic color component data;  
providing an isosceles right triangle plane by extending and scaling the regular triangle plane by using one side of the regular triangle plane as a base;  
dividing the isosceles right triangle plane into a plurality of areas along two sides except the base by using  $i$  lines having slope 1 and  $j$  lines having slope  $-1$ ; and  
identifying an area for representing a color of the pixel according to the basic color component data of the pixel, and outputting the color code according to a predetermined color classification table of the area.
- [c2] 2. The method of claim 1, when the normalized basic color component data of the pixel is represented by  $(c1, c2, c3)$ , and a magnification is represented by  $s$ , a data of the pixel is transformed into  $((c1 - c2 + 1) * s, c3 * s)$  to extend and scale the regular triangle plane into the isosceles right triangle plane.

[c3] 3. The method of claim 1, wherein when the basic color component data of the pixel is represented by C1, C2 and C3 respectively, the identification of the area for representing the color of the pixel is according to equations below:

$$C1 * I_m > (C1 + C2 + C3) > C1 * I_{m+1}$$

$$C2 * J_n > (C1 + C2 + C3) > C2 * J_{n+1}$$

wherein  $I_m$ ,  $I_{m+1}$ ,  $J_n$  and  $J_{n+1}$  represent coefficients corresponding to a position of the division of the isosceles right triangle by using the  $i$  lines having slope 1 and the  $j$  lines having slope -1, wherein  $m$  and  $n$  are integers and  $0 \leq m \leq i, 0 \leq n \leq j$ .

[c4] 4. The method of claim 1, further comprising:  
identifying whether the pixel is chromatic or achromatic according to the basic color component data of the pixel; and  
identifying an area for representing the color of the pixel according to the basic color component data of the pixel, and outputting the color code according to the predetermined color classification table of the area when the pixel is chromatic.

[c5] 5. The method of claim 4, wherein when the basic color component data of the pixel is represented by C1, C2 and C3 respectively, whether the pixel is chromatic or achro-

matic is identified according to equations below:

$Th1_l \leq C3 - C2 \leq Th1_r, Th1_t \leq C1 - C2 \leq Th1_b$  and  $0 \leq (C1 + C2 + C3) < Th1$  (1);

$Th2_l \leq C3 - C2 \leq Th2_r, Th2_t \leq C1 - C2 \leq Th2_b$  and  $Th1 \leq (C1 + C2 + C3) < Th2$  (2);

$Th3_l \leq C3 - C2 \leq Th3_r, Th3_t \leq C1 - C2 \leq Th3_b$  and  $Th2 \leq (C1 + C2 + C3) < Th3$  (3);

wherein the  $Th1_l$ , the  $Th1_r$ , the  $Th1_t$ , the  $Th1_b$ , the  $Th2_l$ , the  $Th2_r$ , the  $Th2_t$ , the  $Th2_b$ , the  $Th3_l$ , the  $Th3_r$ , the  $Th3_t$ , the  $Th3_b$ , the  $Th1$  and the  $Th2$  represent predetermined parameters and  $Th2 > Th1 > 0$ , when any one of equation (1), (2) or (3) is satisfied, the pixel is identified to be achromatic.

[c6] 6. The method of claim 4, wherein when the pixel is identified to be achromatic, further comprises:  
identifying whether the color of the pixel is black color, white color or gray-scale color according to a brightness of the pixel; and  
outputting a color code of the black color, the white color or the gray-scale color.

[c7] 7. The method of claim 6, wherein when the basic color component data of the pixel is represented by  $C1$ ,  $C2$  and  $C3$  respectively, whether the color of the pixel is black color, white color or gray-scale color is identified according to the brightness of the pixel according to equations

below:

when  $(C1+C2+C3) \leq Th\_black$ , the color of the pixel is identified to be black color; and

when  $(C1+C2+C3) \geq Th\_white$ , the color of the pixel is identified to be white color;

wherein the  $Th\_black$  and the  $Th\_white$  are predetermined parameters of the brightness.

[c8] 8. A method of rapid color recognition according to a basic color component data of a pixel to recognize and output a color code when the basic color component data of the pixel is represented by  $C1$ ,  $C2$  and  $C3$  respectively, the method comprising:

identifying an area for representing a color of the pixel according to equations below:

$$C1 * I_m > (C1+C2+C3) > C1 * I_{m+1}$$

$$C2 * J_n > (C1+C2+C3) > C2 * J_{n+1}$$

wherein  $I_m$ ,  $I_{m+1}$ ,  $J_n$  and  $J_{n+1}$  represent different coefficients respectively; and

outputting a color code according to a predetermined color classification table of the area.

[c9] 9. The method of claim 8, further comprising:  
identifying whether the pixel is chromatic or achromatic according to the basic color component data of the pixel;  
and  
identifying the area for representing the color of the

pixel according to the basic color component data of the pixel, and outputting the color code according to the predetermined color classification table of the area when the pixel is chromatic.

[c10] 10. The method of claim 9, wherein whether the pixel is chromatic or achromatic is identified according to equations below:

$Th1_l \leq C3 - C2 \leq Th1_r, Th1_t \leq C1 - C2 \leq Th1_b$  and  $0 \leq (C1 + C2 + C3) < Th1$  (1);

$Th2_l \leq C3 - C2 \leq Th2_r, Th2_t \leq C1 - C2 \leq Th2_b$  and  $Th1 \leq (C1 + C2 + C3) < Th2$  (2);

$Th3_l \leq C3 - C2 \leq Th3_r, Th3_t \leq C1 - C2 \leq Th3_b$  and  $Th2 \leq (C1 + C2 + C3) < Th3$  (3);

wherein the  $Th1_l$ , the  $Th1_r$ , the  $Th1_t$ , the  $Th1_b$ , the  $Th2_l$ , the  $Th2_r$ , the  $Th2_t$ , the  $Th2_b$ , the  $Th3_l$ , the  $Th3_r$ , the  $Th3_t$ , the  $Th3_b$ , the  $Th1$  and the  $Th2$  represent predetermined parameters and  $Th2 > Th1 > 0$ , when any one of equation (1), (2) or (3) is satisfied, the pixel is identified to be achromatic.

[c11] 11. The method of claim 9, wherein when the pixel is identified to be achromatic, further comprises:  
identifying whether the color of the pixel is black color, white color or gray-scale color according to a brightness of the pixel; and  
outputting a color code of the black color, the white color

or the gray-scale color.

[c12] 12. The method of claim 11, wherein when the basic color component data of the pixel is represented by C1, C2 and C3 respectively, whether the color of the pixel is black color, white color or gray-scale color according to the brightness of the pixel is identified according to equations below:

when  $(C1+C2+C3) \leq Th\_black$ , the color of the pixel is identified to be black color; and

when  $(C1+C2+C3) \geq Th\_white$ , the color of the pixel is identified to be white color;

wherein the Th\_black and the Th\_white are predetermined parameters of the brightness.